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Amended claims in accordance with Rule 86 (2) EPC.

(54) **An identification device containing the tridimensional form description of a real world's object and a proceeding related to the use of this identification device**

(57) For a computer based system, identifying real world objects can be computationally expensive, or impossible in practical terms, using the current state-of-the-art input methods and recognition proceedings. This invention solves this problem, as any real world's object can be identified quickly and exactly by a computer based system, if the real world's object to be identified has been previously provided with this identification device containing the tridimensional form description of the real world's object, attached or implemented on it, and if a computer based system have also available the accurate tools to detect, to read and to decode this identification device invention. This device will contains the tridimen-

sional form description and also the physical properties of the object where the referred device is attached or implemented, then allowing to any capable computer based system to build tridimensional scenes quickly and predict how these objects can interact between them in the created virtual scene and then also predict how their real world's counterparts would act or how could be them manipulated in the real world.

In this document, this device and the related proceedings will be referred as "3DFORM-ID DEVICE" and "3DFORM-ID PROCEEDING".

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Description

3. DESCRIPTION OF THE PATENT CLAIM 1 : AN IDENTIFICATION DEVICE CONTAINING THE TRIDIMENSIONAL FORM DESCRIPTION OF A REAL WORLD'S OBJECT

[0001] In this description, the identification device containing the tridimensional form of a real world's object will be referred as a "3DFORM-ID DEVICE"

3.1 COMPONENTS CONTAINED IN A BASIC 3DFORM-ID DEVICE

[0002] An illustrative figure of the main components of an identification device containing the tridimensional form of a real world's object is provided as "figure 1".

[0003] The most basic 3DFORM-ID device consist in any physical support that contains the artificially codified description of the form of the real object where the 3DFORM-ID device is attached, embedded or implemented. This 3D data can be read and detected by a computer based system located inside or outside of the identified object, and if the computer based system is equipped with the accurate tools for doing it. Also the 3DFORM-ID device contains his own position and orientation rereferenced to the description of the real object where the device is attached, and if it would be required, it would contains also the 3DFORM-ID device's own tridimensional form and size.

[0004] If the 3DFORM-ID device is sufficiently big for the detection method used, it can contains several detectable reference points inside, giving to the detection system the necessary information to infer by simple triangulation, or using any other calculation method, the accurate orientation and spatial position of the 3DFORM-ID device relative to the detection system.

[0005] If the tridimensional description of the concerning real object contained in a 3DFORM-ID device is done using digital data, the 3D data stored in a 3DFORM-ID device can be defined in many ways, as using a collection of points defined by their (x, y, z) coordinates, or using vertex, polygons, splines, lines, patches, voxels, NURBS surfaces or any other digital 3D representation method. The description of the object can be also non-digital, as by example using physically engraved or laser etched 3D space points, surfaces or volumes in any other tridimensional support that can be used as a memory device, like crystal blocks, artificial molecular arrangements, scaled sculptures or similar.

[0006] The object's description stored in the 3DFORM-ID device defines the tridimensional form of the attached object in their real world dimensions, in real units choosen in any measurement system. If the stored dimension units are in a different scale to 1:1 of the real world's attached object, a conversion factor must be stored and provided in the 3DFORM-ID device or in the computer based system that detects and reads the 3DFORM-ID

device. The size of the object can also be referenced to other known object size or to the own 3DFORM-ID device size.

[0007] The 3D data can be stored and extrated in different resolutions or levels of detail, accordingly to the requested needs of the user of the computer based system.

[0008] This 3D data can be stored in any available support for making the 3DFORM-ID device: in an electromagnetical or optical support, as a chip RAM, ROM, EEPROM, chip card, magnetic band, printed code bar, CD, DVD, laser etched crystal or any other available memory storage support. Each type of real object requires the most accurate support for making his 3DFORM-ID device. By example, a 3DFORM-ID device for identifying a glass of water, a chair or a fork, can be done using a little EPROM, but a 3DFORM-ID for identifying a car, a building or a city can requires a hard drive disk with high capacity to store only the huge amount of data necessary for describing the detailed tridimensional form of those complex objects.

[0009] The form, size, material used and weight of an encapsulated version of the 3DFORM-ID device can be very diverse, as it can be designed accordingly to the characteristics and requeriments of the real world's identified object and the hardware and software options to be included in the 3DFORM-ID device.

[0010] As this 3D data can be also etched or drawn over the object's surface, or embedded artificially in the identified object's structure or content, then this identified object with the artificially stored object's description data will be also considered as a 3DFORM-ID DEVICE, as the physical support for making the identification device is in this case the own identified object. But in this case must be also defined and codified a reference system for the object, with some detectable points on it, or it would not be possible to position or orientate accurately the loaded object description in a virtual scene.

[0011] To clarify the question, a floppy disk containing a file with only the tridimensional description of the own floppy disk, wouldn't be a 3DFORM-ID device.

Also is needed to be defined previously some detectable points in the real object, to be detected by a 3DFORM-ID capable system, then serving these detected real objects' points as the referenced position and orientation of the real object relative to his tridimensional description, and then allowing to the detection system to infer the exact position and orientation of the real floppy disk. The default coordinates center of the reference system provided in the floppy disk's file will not be valid, as the system can't inferes only from this data the accurate orientation and position of the real floppy disk. Two floppy disks of the real world containing the same file with only the tridimensional description of the floppy disk, both will be erroneously positioned in the same spatial wrong position in the virtual scene, and also surely with a wrong orientation.

[0012] The basic data provided with a 3DFORM-ID de-

vice is the tridimensional form of the attached real world's object. But much more data can be included in a 3DFORM-ID device concerning the identified real world object, not only to allow a more precise identification of the attached real world object, but more important, to allow to a system to predict and simulate the potencial actions of the identified objects in a given environment.

3.1-A: PHYSICAL PROPERTIES OF THE ATTACHED REAL WORLDS OBJECT

[0013] Inside a basic 3DFORM-ID device can be stored also any physical properties of the real object, as the weight, volume, main dimensions, material and chemical composition, maleability, conductivity, temperature, color, transparency, reflectivity, density, magnetism, age, maximum speed, ...and so. This information can be used by a computer based system for doing dynamic simulations in a tridimensional virtual scene in the system's memory.

3.1-B: 2D ORTHONORMAL PROFILE VIEWS OF THE ATTACHED REAL WORLD'S OBJECT

[0014] Inside a basic 3DFORM-ID device can be stored a set of images with ortonormal profiles of the object, to be used by a computer based system to compare the identified object with other real world objects that maybe doesn't contains a 3DFORM-ID device, or compared with other objects in a digital library of 3D models. Also these profiles can allow to the system to identify 2D drawings or images obtained by any input device conected to the system.

3.1-C: SEMANTIC/SINTACTIC DATA CONCERNING THE ATTACHED REAL WORLD'S OBJECT

[0015] Inside a basic 3DFORM-ID device can be stored some common names describing the attached object in various languages, and also their synonymes and some basic sintactic rules concerning the use of main adverbs and articles related to these names. With this information, a computer based system can construct tridimensional virtual scenes in a memory using only the input words or, in a reverse way, can output words or sentences after reading them as an inherent property of the virtual objects located in a virtual tridimensional scene.

3.1-D: HIERARCHIES AND SUB-OBJECT DATA CONCERNING THE ATTACHED REAL WORLD'S OBJECT

[0016] Inside a basic 3DFORM-ID device can be stored other possible information concerning sub-object pieces, articulated parts or hierarchical links between these sub-objects, and also their link or dependence to a greater super-structures where the concerning attached object can be included. This device can contain

information about object's handles, tags or any necessary reference to allow to a computer based system to manipulate accurately the loaded tridimensional representations of the identified objects.

3.1-E: TEXTURE MAPS AND AUDIO DATA CONCERNING THE ATTACHED REAL WORLDS OBJECT

[0017] Inside a basic 3DFORM-ID device can be stored data concerning surface texture maps for describing some pattern based issues of the identified object as the aspect, the surface rugosity, termical maps or audio data that can help to a computer based system to identify more accurately the object and, as a result, making more exact predictions about the system's real world environment.

3.1-F: HANDLING AND PERFORMANCE INSTRUCTIONS CONCERNING THE ATTACHED REAL WORLD'S OBJECT

[0018] Inside a basic 3DFORM-ID device can be stored data concerning some instructions for humans or for computer based systems to allow them to manipulate accurately both the real object located in the system's real environment, and the tridimensional simulation of the same object in the virtual space of the system. This type of data can includes identification movements of the object, as those done by an animal, or the object's allowed freedom degrees of movement, or the rotation axis of the object.

Also this type of instruction data can be very diverse, as can concern habits, growing rules, reproduction rules, feeding rules, energy requirements, or recycling and storage instructions, as a brief example.

3.1-G: THIRD PART RELATED INTELLECTUAL AND INDUSTRIAL PROPERTY DATA CONCERNING THE ATTACHED REAL WORLD'S OBJECT

[0019] Finally, in a basic 3DFORM-ID device can be included additional data subject to third part intellectual or industrial property rights as trademarks, identification code bars, logos, serial number, price, designed color schemes, or other additional data in accordance to the specifications of the owner of the rights of the referred intellectual property.

[0020] It can be said, a 3DFORM-ID device is an invention that allows a complete description and identification of a real world's object .In some way, a 3DFORM-ID device is like the DNA of any existing object, animated or inanimated.

3.2.: 3DFORM-ID DEVICE MODULAR OPTIONS

[0021] An schematic view of the description of some option modules or components to be added or included in a 3DFORM-ID device is provided as "figure 2" .

A 3DFORM-ID device that contains also one or more of the following options is by itself a true 3DFORM-ID system, with more or less capability for operate in an independent way using a 3DFORM-ID related proceeding.

3.2-A: LOGIC UNIT AND ADDITIONAL STORAGE

[0022] If a 3DFORM ID device contains a processor and a memory sytem as modular options, then the 3DFORM-ID device can store software to analize his own data or the data coming from an external source. Also in this way the 3DFORM-ID device can store changing conditions on time, to track his own position in a period of time or to store new detected objects in his environment, by example.

3.2-B: TRIDIMENSIONAL FRAME BUFFER

[0023] A tridimensional frame buffer will alllows to a 3DFORM-ID device to render in images the tridimensional scene content of an optional memory system, then the images can be output to a screen for being seen by an user, or also can be compared with other images generated by other applications or introduced by an external input device.

3.2-C: VOICE RECOGNITION SOFTWARE

[0024] A software that allows the recognition of the words spoken by an user of the system.

3.2-D: TUE TYPE SOFTWARE

[0025] TUE means Tridimensional Understanding Engine, and this is a term used here to describe any type of software that allows to a computer based system to manipulate the tridimensional objects obtained from a 3DFORM-ID device and download them in the sytem's memory, to proceed after to making predictions and simulations with these loaded tridimensional objects and accordingly to the specific requeriments of a system's user. This type of software can read also tridimensional objects or tridimensional actions from a 3D library to compare the library objects with the real world's identified objects. Also a TUE must be capable to accept sentences and convert them in tridimensional scenes, or to output sentences describing tridimensional scenes contained in the system's memory.

3.2-E: SEMANTICISINTACTIC PROCESSING SOFTWARE

[0026] As a 3DFORM-ID device can contains also semantic or sintactic information concerning the description of the real world's object, then this software can help to a TUE like software to build tridimensional scenes in a 3DFORM-ID device containing a processor and memory options.

3.2-F: 3D LIBRARY

[0027] A 3D library is a resident collection of tridimensional objects containing the same type of objects descriptions (forms, physical properties) that are available in a 3DFORM-I device. Using this library, a 3DFORM-ID device based system can identify more easily a detected real world's object that not contains attached a 3DFORM-ID device, or can help to a TUE software to construct tridimensional scenes using input sentences, identification noises or any other type of input data.

3.2-G: NETWORK CONNECTION

[0028] A 3DFORM-ID device based system with a network conection can receive and interchange information with other 3DFORM-ID devices also conected to the network, or with external systems for interchange or research any type of information required by a 3DFORM-ID device based system.

3.2-H: 3D RECOGNITION SOFTWARE

[0029] If the 3DFORM-ID device based system have also available some input device for detecting or scanning other real world's objects that doesn't have attached a 3DFORM-ID device, then he will need this software to built a tridimensional form with the 3D scanned data and after comparing it with other existing 3D objects contained in the 3D library, with the purpose of being identified.

3.2-I: EXTERNAL APPLICATIONS

[0030] A 3DFORM-ID device based system can contains any additional application software or operating system accordingly to the requeriments of the system.

3.2-J: GLOBAL POSITION RECEIVER

[0031] On despite a basic 3DFORM-ID device doesn't needs to know his own spatial position in the real world, sometimes it would be necessary to incorporate a global position receiver as GPS or Galileo or based in any other positional system externally referenced. This option can help to a 3DFORM-ID device based system to built the accurate tridimensional scenes in his memory, without using an internal proceeding for doing it, as the triangulation method for positioning the detected objects in the virtual memory of the system.

3.2-K: MOTION DRIVERS

[0032] A 3DFORM-ID device based system equipped with motion drivers can manipulate a vehicle or a robot in a real world environment.

3.2-L: ENERGY SOURCE

[0033] A basic 3DFORM-ID device is a device without an independent source of energy, then his utility is conditioned by the capabilities of an external system to detect and read the device.

An independent energy source module option can increase considerably the capabilities of a 3DFORM-ID device.

3.3. INPUT/OUTPUT 3DFORM-ID DEVICE OPTIONS

[0034] An schematic view of the description of some possible input /output option modules to be added or included in a 3DFORM-ID device is provided as "figure 2"

3.3-A: 3DFORM-ID READER AND EMITTER

[0035] A basic 3DFORM-ID device have not installed on it an emitter or a reader from or to other 3DFORM-ID devices or from or to other 3DFORM-ID based systems. This would be the option for doing it.

3.3-B: INPUT/OUTPUT SIGNAL EMITTER/RECEIVER

[0036] A basic 3DFORM-ID device have not installed a generic INPUT / OUTPUT SIGNAL EMITTER / RECEIVER from or to other signal or receiver source. This would be the option for doing it.

3.3-C: 3D SCANNER

[0037] A 3-D Scanner input device option will allow to a 3DFORM-I system to scan and then to identify real world objects without an installed 3DFORM-ID device. The 3D scanner can be of any type of those available in the market, as a laser 3D scanner, proyected light 3D scanner, contact 3D scanner or other.

3.3-D: PROXIMITY RADAR

[0038] A proximity radar will allows to a 3DFORM-ID system to detect any unidentified real world's object in his immedate environment.

3.3-E: CAMERAS

[0039] Optical cameras, termical cameras, infrared cameras or any other type of cameras can be connected to a 3DFORM_ID system, to allow him additional detection capabilities of unidentified objects or possible corrections to be done in the identified objects with an attached 3DFORM-ID device.

3.3-F: INPUT/ OUTPUT AUDIO

[0040] A microphone and a speaker can be added to a 3DFORM-ID system, allowing the sytem to communicate

verbally with an user or also detecting an external object by recognizing his audio signal and comparing it with the audio stored in an object contained in a previously defined 3D library.

3.3-G: 3DFORM-ID PRINTER

[0041] A 3DFORM-ID printer can help to a 3DFORM-ID system to print to a magnetic band, to a chip memory or to any other electromagnetic or physical support the description content obtained from a previously non identified real world's object, and then to proceed to attach this new 3DFORM-ID device to the new real world's object, then it would be quickly identified by his tridimensional form and physical properties by a 3DFORM-ID based system.

3.3-H: OTHER INPUT/OUTPUT OPTIONS

[0042] Any additional input/output option can be add to a 3DFORM-ID system, to allow him additional capabilities of detection of unidentified objects and as a security cheking of the identified objects.

4. DESCRIPTION OF THE PATENT CLAIM 2 : A GENERAL PROCEEDING FOR THE USE OF AN IDENTIFICATION DEVICE CONTAINING THE TRIDIMENSIONAL FORM OF A REAL WORLD'S OBJECT

[0043] In this description, the proceeding for the use of an identification device containing the tridimensional form of a real world's object will be referred as a "3DFORM-ID PROCEEDING", and the identification device will be referred as "3DFORM-ID DEVICE"

4.1 MAIN STEPS IN THE 3DFORM-ID PROCEEDING RELATED TO THE USE OF A 3DFORM-ID DEVICE.

[0044] An illustrative figure of the main steps in the 3DFORM-ID proceeding related to the use of a 3DFORM-ID device is provided as "figure 3".

4.1-A: DETECTING, READING AND DECODING IN A COMPUTER BASED SYSTEM ANY 3DFORM-ID DEVICE IN A GIVEN REAL WORLDS ENVIRONMENT

[0045] First of all is required a system capable of detecting, reading and decoding one or more 3DFORM-ID device types. The detection can be done in many ways as by contact, by proximity or by receiving an external signal, if the 3DFORM-ID contains on itself a signal generator and his own energy source. The energy source of the 3DFORM-ID device can be also electromagnetically induced by an external source, by example generated by the detecting system. For determining the distance and orientation of the 3DFORM-ID device, the system can do it in several ways, by example by simple triangulation between the detected 3DFORM-ID device and oth-

er object's parts identified optically or electromagnetically. If the 3DFORM-ID device is sufficiently big for the detection method, it can contain several detectable reference points inside, giving to the detection system the necessary information to infer by simple triangulation or other calculation method the accurate orientation and spatial position of the 3DFORM-ID device relative to the detection system. If the same object contains more sub-objects with their own 3DFORM-ID devices, or other more simple tridimensional position devices available currently on the market, the detection system can also determine the distance, relative position and orientation of all the detected 3DFORM-ID devices in a given environment. Once detected, the system will proceed to extract the content of the 3DFORM-ID device and decoding this extracted content with the appropriate software tool.

4.1-B: BUILDING A VIRTUAL TRIDIMENSIONAL SCENE IN THE MEMORY OF THE COMPUTER BASED SYSTEM.

[0046] For this step of the proceeding, the computer based system requires to have installed the accurate hardware and software tools to allow the creation and manipulation of tridimensional, virtual scenes in the system's memory. Once the 3DFORM-ID content is loaded in the system, the system will proceed to build a tridimensional scene with this content in his defined virtual space. The loaded tridimensional objects will be arranged in the appropriate positions and orientations to match the real world's positions and orientations of their real world's counterparts, and referenced spatially to the own 3DFORM-ID capable system, or to one of the other loaded tridimensional objects or to any specific reference system defined by the user or accordingly to the system requirements.

4.1-C: MAKING TRIDIMENSIONAL SIMULATIONS AND PREDICTIONS IN THE MEMORY OF THE COMPUTER BASED SYSTEM.

[0047] The third step in the proceeding is making simulations and predictions in the memory of the computer based system. For achieving these requirements, the system's installed software must be capable to read and manage all the necessary properties for an specific application of all the virtual 3D objects downloaded from the detected 3DFORM-ID devices, and proceed to elaborate simulations, interactions or predictions between these loaded virtual objects and accordingly to the requirements of the system or by an user of the system. These simulations can be very simple, as to render (see figure 3-C) in the frame buffer of the system an image more or less realistic of the composed virtual scene, or extremely complex, as some dynamic simulations implying many objects interacting between them. The final output of the simulation done inside the system's memory also can be very diverse, as to output orders for control-

ling the movements of a robot device in the real world or to output a semantic description of the virtual scene, to be listed like a printed text or, using a speaker, to be told to an user of the system.

[0048] On definitive, the described proceeding is like a self-configured operating system, where each object is like a piece of a tridimensional puzzle that can be built by a system capable of putting all these tridimensional pieces together and after predicting all their interactions.

4.2 SOME DIRECT APPLICATIONS OF A GENERAL PROCEEDING FOR THE USE OF AN IDENTIFICATION DEVICE CONTAINING THE TRIDIMENSIONAL FORM DESCRIPTION OF A REAL WORLD'S OBJECT

[0049] Any application that requires to load in his system the tridimensional form and orientation of a real world's object, is a potential user of a 3DFORM-ID device and proceeding. As a result, the number of applications that can use the proceeding described here is very extensive. On the next topics, some obvious applications are briefly described.

4.2-A: AN APPLICATION FOR TRAFFIC CONTROL AND A TOTALLY AUTOMATIC DRIVING

[0050] Any type of traffic system would be benefited on the massive use of 3DFORM-ID devices and the current 3DFORM-ID proceeding. An example is the traffic of vehicles on roads. Each vehicle must have a computer based system with the capability to detect 3DFORM-ID devices installed in other vehicles, or on trees, buildings, persons, animals, traffic signals and any object that can be usually found in a road. The vehicle must contain also his own 3DFORM-ID device, then the system will be capable to load accurately oriented and positioned, in his tridimensional virtual memory scene, all the surrounding objects around the own vehicle. It must be specified a ratio of detection, accordingly with the speed of the vehicle. In this simple way, it's possible to automatize all the driving process to a high degree. The user of the vehicle can have the option to see in a screen an exact virtual rendered reproduction of the surrounding scene. Such system doesn't need to use a global position device as GPS or Galileo, but it would be useful their use for re-inforcing the security of the application. The vehicle must contain also a short range radar to detect possible big unidentified objects without an attached 3DFORM-ID device or with a damaged unit. A proximity radar can announce any possible appearance of unidentified objects, forcing the accurate reaction of the vehicle, and giving to the application a security level similar or superior to those required in the train service system. Similar applications based in the massive use of 3DFORM-ID devices can be developed for maritime or air traffic control.

4.2-B: AN APPLICATION FOR STORAGE AND MANAGEMENT OF REAL WORLDS OBJECTS.

[0051] Another huge area of application of the 3DFORM-ID based proceeding and devices is their use in the storage or management of any type of real world's object. By example, for doing an accurate management of products in a supermarket, as the supermarket 3DFORM-ID device based computer system will have the necessary information of the tridimensional form, position and orientation of all the products that would contains a 3DFORM-ID device and the system could simulate in his virtual memory how these objects must be located in the stands or how they must be packaged for a specific user. The stands, the refrigerators or the own supermarket building can contain also their own 3DFORM-ID device. An user also will be capable to do a trully interactive 3D virtual visit to a supermarket for doing the purchase, using his own domestic version of a computer system based in the remote use of 3DFORM-ID devices and proceedings. The user can't be limited to pickup a generic object in a visual catalogue, but to pickup the real thing, the concrete issue stored in a specific position at the supermarket. The user could be capable to render in his 3DFORM-ID based system terminal an absolutely fidedign view of his own virtual position at the supermarket, without the need to install a single real camera in the supermarket. Also the packaging of many different products in a single shipment can be automatized and optimized in a high degree: As the supermarket's 3DFORM-ID based system will have the necessary information of the tridimensional form, size, weight, conservation temperature or deformability of each product included in the order done by an specific user, then it can simulates in a tridimensional virtual space the best method to accomodate all the products in a shipping box, previously to accomodate all these objects inside the real world's shipping box in a fully automatic way.

4.2-C: AN APPLICATION FOR SECURITY CONTROL

[0052] Military, civil or policial security systems can be benefited and simplified enormously by the massive implantation of 3DFORM-ID devices. An hipothetical world with all the people identified with 3DFORM-ID devices and tracked permanently, can makes virtually impossible that many types of crimes will be done. And if the crime finally occurs, it would be possible to reconstruct to the minimal detail all the crime, with their actors, surrounding witnesses, exact positions or actions fully rendered and reconstructed again in a virtual memory, and the actions can be observed and analized from any point of view choosen by the user of the system. Current prisions can turns also less useful with a full implantation of 3DFORM-ID devices, as liberty privation can be substituted for progressive intimacy privation according to the magnitude of the crime. In the domestic security area, the applications also can be infinite. If an user wants to follow his childrens

in the school, their 3DFORM-ID devices will tell him exactly where the childs are in that moment, how they are seated, what they are doing, how are their chairs, or if they have forgotten a coat on the gym, because the 3DFORM-ID devices of the gym and the coat can be detected by the 3DFORM-ID based system of the school's building and then transmitted and rendered in the virtual memory of the user home's 3DFORM-ID based system, working with the described 3DFORM-ID proceeding.

4.2-D: AN APPLICATION FOR OMNIPRESENT VIRTUAL CAMERAS

[0053] In an hipotetical world where all the objects on it would have a 3DFORM-ID device installed on them, it would be possible to reconstruct, in the virtual memory of a computer based system that works with a 3DFORM-ID based proceeding, any concrete place of the world. For that, the user simply must specify the exact spatial coordinates of the place where the user wants to put his virtual camera, and specify also a ratio of reconstruction. Then the 3DFORM-ID capable system would proceed to search on the network the 3DFORM-ID system with network connection that would be more near to the selected coordinates, then ordering to the remote system to detect and load all the 3DFORM-IDs of the objects contained in a surrounding ratio required by the user, and sending all this data to the user's system. There, using all the data provided by the distant 3DFORM-ID devices, the local system would proceed to render an exact virtual view of the selected place, where the user will be capable to turn around the virtual camera, to zoom in or out to the details, or advance freely his virtual camera in any direction, and obtaining the user any available information or interaction from any object that the user would pick from the tridimensional scene. An stereoscopical virtual camera can also be defined, and as the local meteorological data or the local sunlight position hour can be properly reported by one of the objects downloaded, then the rendered vision of the user can be subjetively very similar to the real view that a local person could be seeing in the real place in the same moment. This application would be a powerful sustitute of the current real control cameras or web cameras, as the control of the virtual camera by the user can be much more efficient for many things.

4.2-E: AN APPLICATION FOR DOMESTIC, MILITARY OR INDUSTRIAL ROBOTS

[0054] A robot based in a 3DFORM-ID proceeding would be capable to interact with their surrounding environment quickly and safely. For that, the robot must contain itself a 3DFORM-ID device to allow to their own system to load himself and all the surrounding objects in his system's virtual scene with the accurate relative positions and orientations, then the robot can proceed to simulate in his memory any action to be done by himself, before

executing any action in the real world. As a 3DFORM-ID identified environment can allow to the robot to download from his environment not only the tridimensional form of the surrounding objects, but all the objects' capabilities and physical properties, then the robot can proceed to predict quickly and with a high degree of accuracy not only the actions he can performs in the real world but also how would be the response of the surrounding environment to his own robotic actions. As the 3DFORM-ID device contains also semantic info and basic syntactic rules concerning the identified object, then the robot can receives direct verbal instructions by an user, concerning the objects located in a given moment in his environment, and then the robot would proceed to decode these received verbal instructions in their corresponding tridimensional objects, and then proceeding to built a tridimensional scene to understand the user requeriments, and simulating, previously to making it, the accurate action in his virtual memory and finally proceeding to act in the real environment as a perfect slave under his user's orders.

Claims

1. An identification device containing the tridimensional form description of a real world's object.

This device stores an artificially codified description of the tridimensional form and other physical properties of a real object or a group of real objects, that exist in the real world. This device is attached or implemented in the real object or group of real objects described in the device. This device can be detected, read their content and decoded by a computer based system capable of doing it. This computer based system can be located inside or outside of the real world's object where is attached, or implemented, the referred device. This device stores also his own position and orientation relative to the real object description where the device is attached.

2. A general proceeding for the use of an identification device containing the tridimensional form description of a real world's object.

This proceeding is related to the use of a device that stores an artificially codified description of the tridimensional form and other physical properties of a real object that exist in the real world, and where is attached, or implemented, the referred device. The device contains also his own position and orientation referenced to the real object where the device is attached. The use is specified as the capability of a computer based system to detect, to read and to decode the data stored in one or more of these devices, and then the system will proceed to built, in the system's memory, a tridimensional virtual scene containing the extracted 3D form description of the real world object or group of objects, with the pro-

posal of making simulations and predictions in this tridimensional virtual scene and then solving concrete application requeriments done by an user of the system.

Amended claims in accordance with Rule 86(2) EPC.

1. In the proposed patent, the identification device contains always electromagnetical or visual reference points that have been previously referenced to the 3D shape data, allowing a straightfoward approach to the problem, as the system only needs to detect and read these points for matching the exact position and orientation of the detected object relative to the detection system, then allowing to the system interacting quickly and exactly with their real world environment.

It's possible to define an application for the same purpose but based in the proposed patent, but in this case both the cloth and the human must contains a device attached in a fixed position, referenced to the included 3D shape data sets using more than three detectable points for determining not only the position of the device related to the object, but additionally at least two detectable but mobile reference points for each articulation in the client's body (in a similar way is done in motion capture systems), and in the case of the cloth piece, using a myriad of spreaded detectable non fixed reference points over the cloth, all of them defined and referenced also as mobile reference points in the stored 3D shape database of the attached cloth. If these reference points would be of electromagnetical nature, it would make unnecessary the use of a camera or a mirror for the simulation of the garment over the client, as is proposed in the relevant document, and would allow also the exact 3D simulation when the cloth and the client are each one in remote locations.

Finally, In the explanation of the proposed patent, a linked version based in the identification number is also suggested for back security reasons or verification, but is not key to the nature of the patent, that is, a device attached to a fixed position in the object that contains the 3D shape description of the object referenced to the own attached object, using detectable reference points that are referenciaded also in the provided 3D shape description. This approach of combining and including both elements in the device (the 3D shape description and the position of the detectable reference points related to this 3D description) is the true target of the patent, conceptually different to other approaches to solve similar problems.

Then the relevant document concerns a different device and method of use than those proposed in the filed patent EP0681005.5 in claims 1 and 2.

2. With the relevant document BOUKRAA M ET

AL: "Tag-based vision: assisting 3d scene analysis with radio-frequency tags" INFORMATION FUSION 2002 pages 412-418 PISCATAWAY, NJ, USA IEEE vol.1

In this relevant document paper the authors configure a system for assisting in the analysis of tridimensional scenes by the use of radiofrequency tags linked to a network where the 3d database of the detected objects can be downloaded for the creation of a virtual 3d scene where the position and orientation of the downloaded objects are extracted from the image processing of the real object's shape edges captured by a videocamera.

First of all, the proposed patent is not related to the use or not of RFID radiofrequency devices, as it can work by using radiofrequency, but also can be configured using wired or visual method or inclusively by contact, then the RFID approach is not key for the patent concept.

About including the 3D shape of the attached object into the device, the authors says literally in the preamble of their method (pg.413, line 42) : "RF Tag can contain-or give a key to- information that cannot be retrieved only from the visual content. This includes physical and chemical properties (such as 3D configuration and real dimensions, weight, tactile info...)" . This is said as an introduction about the universal capabilities of an RFID tag, that is, that an RFID tag can contains any type of information inside. But including inside the RFID tag the 3D shape of the real object is NOT the method explained in the paper by the authors. The authors proposal is about using an RFID tag with a number linked to a networked database, to allow an external system to download a 3D model of the real object for assisting a 3D scene analysis by image processing using also a videocamera.

The focus of the proposed patent is very different, as was said in the previous comparison: the 3D shape of the attached object is stored inside the identification device, allowing a decentralized way to deal with the surrounding environment. This is specially significative when the network is not available or damaged, or for many other reasons, by example when the maker of the product is long ago out of business. The approach to include the whole 3D shape inside the identification device gives independence and longevity on the use of the identification device in other environments, far away of the production or distribution channels, as can be by their posterior potential usefulness by domestic robots or for automatic manipulation of the real object in their final recycling process.

Another fundamental difference is in the referenced nature of the 3D data in the proposed patent: the identification device contains always electromagnetic or visual reference points that have been previously referenced to the 3D shape data, allowing a

straightforward approach to the problem of orienting and positioning the 3D shape in the virtual scene to match the surrounding reality, as the system only needs to detect and read these points for matching the exact position and orientation of the detected object relative to the detection system, then allowing to the system interacting quickly and exactly with their real world environment.

In the compared relevant paper, this is done by processing images of the real object captured by a videocamera, to determine the main edges or profiles of the real object, then correlating them to the downloaded 3D shape for determining their spatial position and orientation. As is said in the Conclusion by the authors, the system proposed has a problem of robustness, as is more or less efficient accordingly to the complexity of the shape of the object. As opposed, the device and method proposed in my patent is independent of the complexity of the shape to evaluate the position and orientation of the real world object, as the 3D shape is referenced to detectable spatial points also available in the device, and this means a considerable improvement for solving the same problem.

Then the relevant document concerns a different device and method of use than those proposed in the filed patent EP0681005.5 in claims 1 and 2.

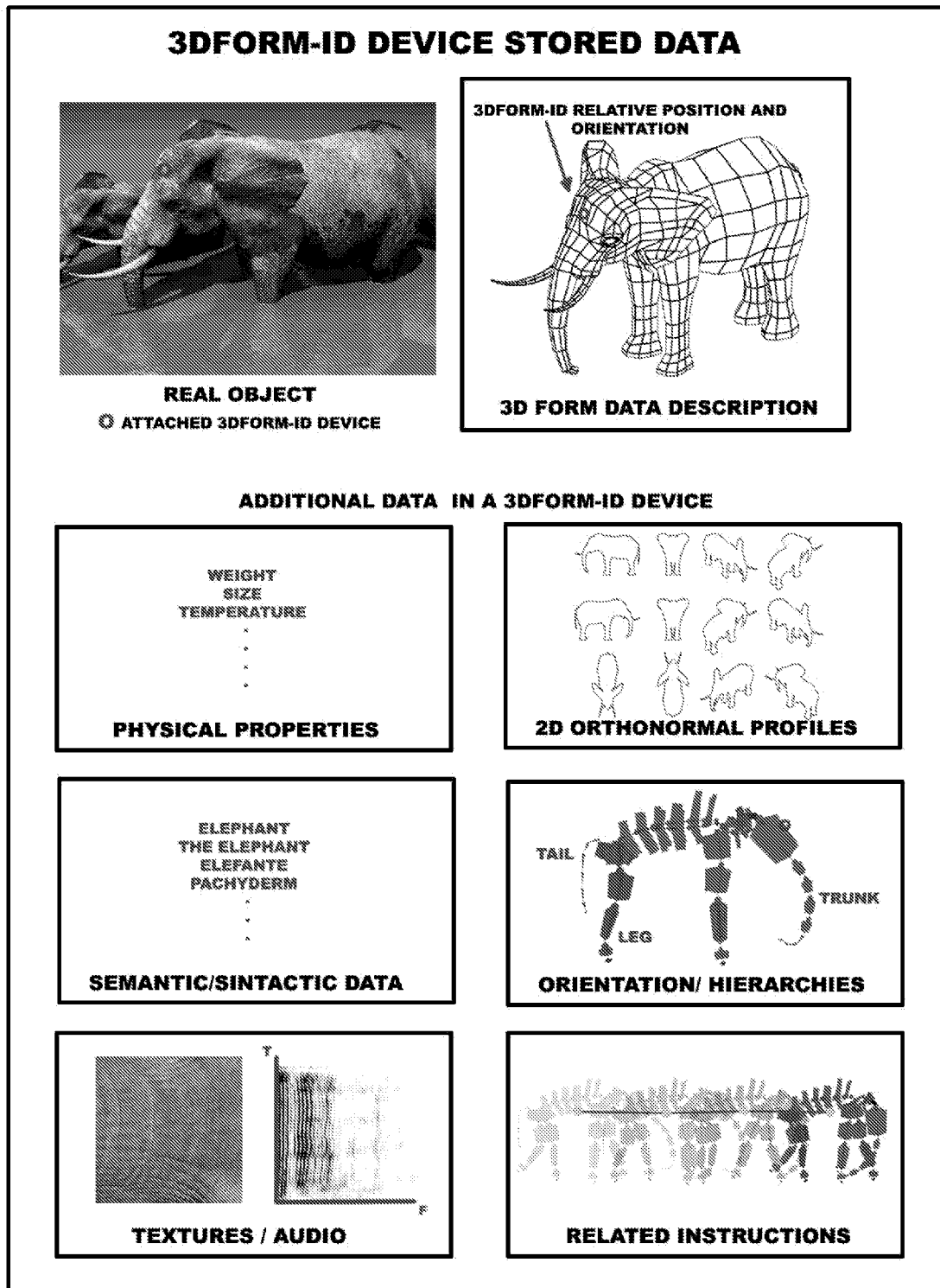


FIGURE 1

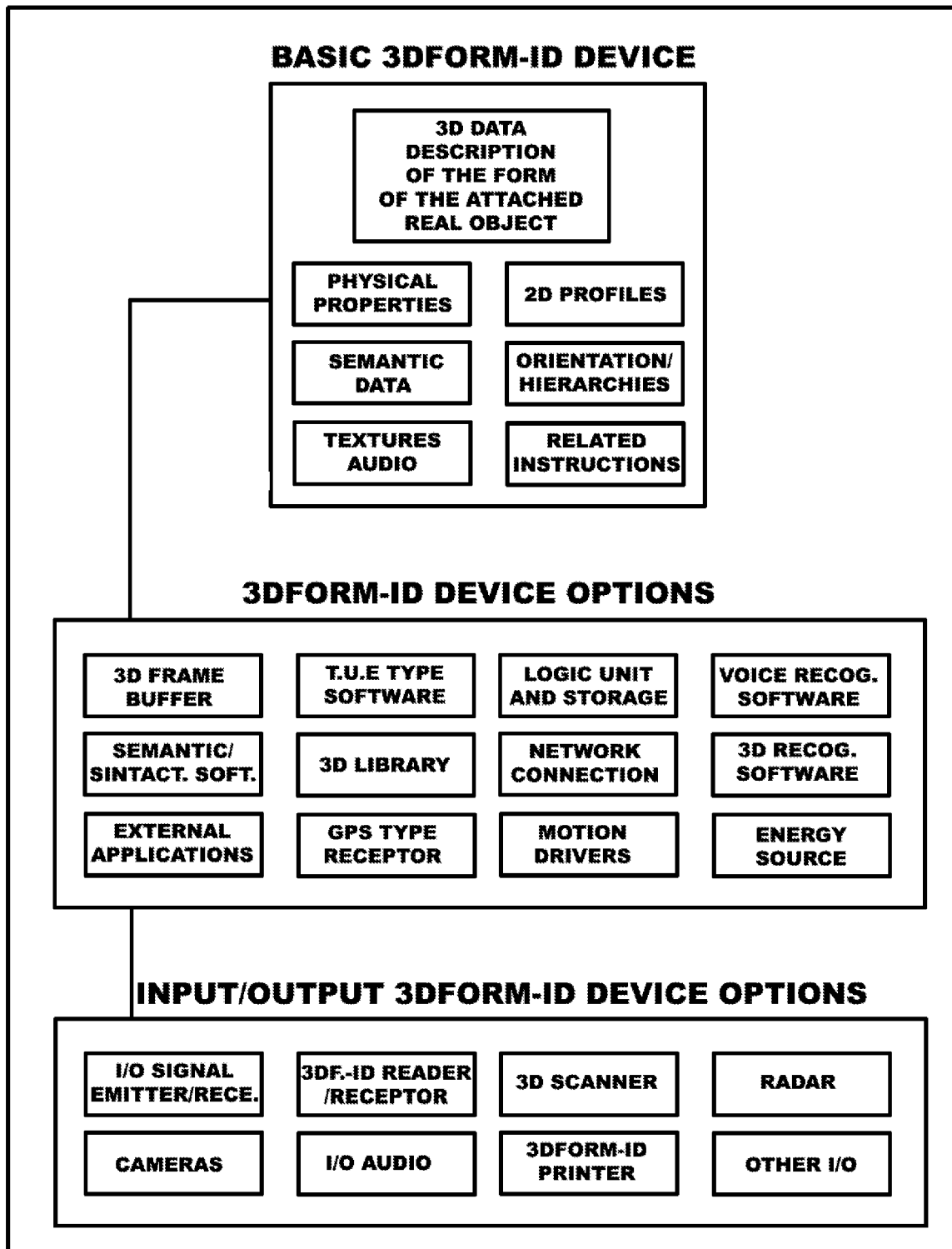
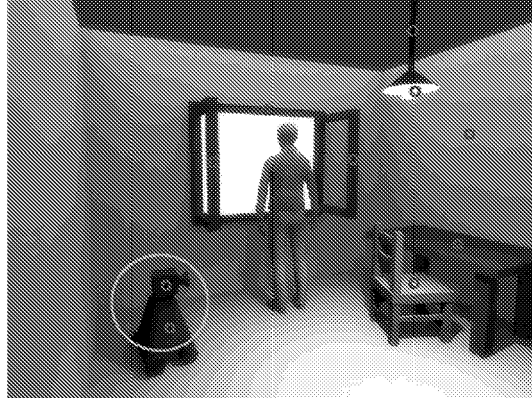
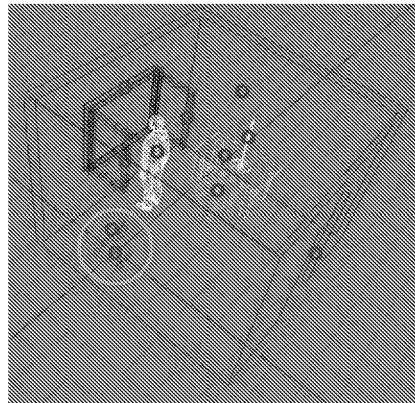
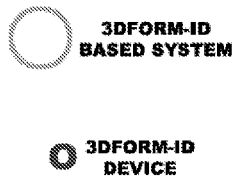


FIGURE 2

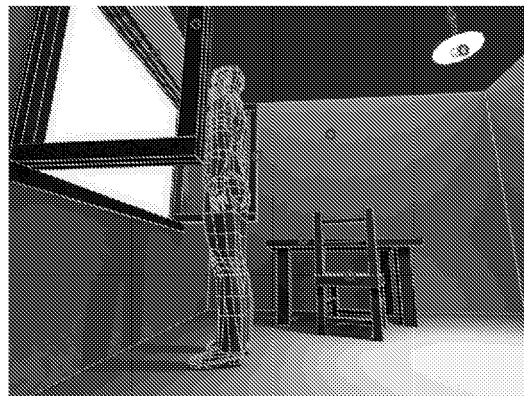
3DFORM-ID PROCEEDING



A: DETECTING, READING AND DECODING IN A COMPUTER BASED SYSTEM ANY 3DFORM-ID DEVICE IN A GIVEN REAL WORLD'S ENVIRONMENT



B: BUILDING A VIRTUAL TRIDIMENSIONAL SCENE IN THE MEMORY OF THE COMPUTER BASED SYSTEM



C: MAKING TRIDIMENSIONAL SIMULATIONS AND PREDICTIONS ON THE MEMORY OF THE COMPUTER BASED SYSTEM

FIGURE 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 38 1005

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	K. KJAERSIDE ET AL.: "ARDressCode: augmented dressing room with Tag-based Motion Tracking and Real-Time Clothes simulation" CENTRAL EUROPEAN MULTIMEDIA AND VIRTUAL REALITY CONFERENCE, 2005, pages 43-48, XP002395984 * page 44, right-hand column, line 6 - line 21; figure 2 *	1,2	INV. G06T17/00
X	BOUKRAA M ET AL: "Tag-based vision: assisting 3d scene analysis with radio-frequency tags" INFORMATION FUSION, 2002. PROCEEDINGS OF THE FIFTH INTERNATIONAL CONFERENCE ON JULY 8-11, 2002, PISCATAWAY, NJ, USA, IEEE, vol. 1, 8 July 2002 (2002-07-08), pages 412-418, XP010595150 ISBN: 0-9721844-1-4 * page 413, left-hand column, line 42 - right-hand column, line 14 *	1,2	
X	MAE Y ET AL: "Object recognition using appearance models accumulated into environment" PATTERN RECOGNITION, 2000. PROCEEDINGS. 15TH INTERNATIONAL CONFERENCE ON SEPTEMBER 3-7, 2000, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, vol. 4, 3 September 2000 (2000-09-03), pages 845-848, XP010533210 ISBN: 0-7695-0750-6 * page 845, left-hand column, line 13 - right-hand column, line 6; figure 3 *	1	TECHNICAL FIELDS SEARCHED (IPC) G06F
Y	-/--	2	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 September 2006	Examiner PEREZ MOLINA, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	H. HONTANI: "a visual tracking system using RFID tag" PROCEEDINGS OF SPIE-IS&T ELECTRONIC IMAGING, INTERNET IMAGING VI, EDITED BY SIMONE SANTINI, RAIMONDO SCHETTINI AND THEO GEVERS, vol. 5670, 2005, pages 165-174, XP002395994 * page 165, line 11 - line 27; figures 1,7 *	2	
A	----- US 2005/148828 A1 (LINDSAY JEFFREY D) 7 July 2005 (2005-07-07) * page 9, paragraph 87 - paragraph 89; claims 1,47; figure 3 *	1,2	
A	----- WO 2005/107274 A (AUGMENTED MEDIA APS; NIELSEN, BJOERN, WINTHER; KRISTENSEN, SUNE; ANDER) 10 November 2005 (2005-11-10) * abstract; claims 1,24 * -----	1,2	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search		Date of completion of the search	Examiner
The Hague		18 September 2006	PEREZ MOLINA, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 2
 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 38 1005

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-09-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005148828 A1	07-07-2005	NONE	
WO 2005107274 A	10-11-2005	NONE	